MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

ETM4116 – DATA AND MULTIMEDIA NETWORKING
(TE)

4 MARCH 2020
2:30 P.M. – 4:30 P.M.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 3 pages with 4 questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1

a) Consider an email system.

(i) A typical email system consists of three major components: user agents, mail servers and Simple Mail Transfer Protocol (SMTP). Draw a high-level view of how these components are related and explain briefly each of the components. [6 marks]

(ii) Suppose that you are writing an email to your friend, Bob. With the help of a suitable diagram, explain how the email will be delivered to Bob. [8 marks]

(iii) Differentiate between the following two mail access protocols: Post Office Protocol version 3 (POP3) and Internet Mail Access Protocol (IMAP). [6 marks]

b) Suppose that you enter the following commands which are followed by two carriage return sequences at the terminal program of a Linux machine.

```
telnet www.mmu.edu.my 80
GET index.html HTTP/1.0
```

(i) What is the expected output? [1 mark]
(ii) Explain the commands and the output. [4 marks]

Question 2

a) User Datagram Protocol (UDP) is known to provide "bare bones" transport layer services as compared to Transmission Control Protocol (TCP). Discuss why there is a need for UDP. Give two sample applications that run on top of UDP. [6 marks]

b) Figure Q2.1 shows the packet format of a fictitious transport layer protocol. Discuss what functions can be offered by the protocol. Justify your answer. [8 marks]

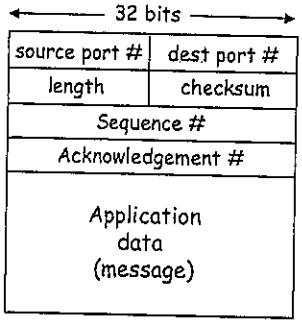

Figure Q2.1

Continued...

c) Design a reliable data transfer mechanism for an environment with occasional bit errors and packet losses. Explain your answer with the help of finite state machine. [11 marks]

Question 3

a) Network Address Translation (NAT) is used as a short term relief for IP address shortage. Explain how it works. [6 marks]

b) IP version 6 (IPv6) is the next generation network protocol to replace IP version 4 (IPv4).
   i) Give one advantage of IPv6 over IPv4. [2 marks]
   ii) Compare the size of an IP address in IPv4 and IPv6. [2 marks]
   iii) Suppose that your company is upgrading all of its networks to IPv6. Further suppose that you are asked to devise a transition strategy so that your company branch networks at different cities can communicate with each other over an IPv4 network. With the help of suitable diagram, explain your proposal. [6 marks]

c) Name one Internet routing protocol for each category for each link-state and distance-vector approach. Compare the configuration complexity and message complexity of these protocols. [9 marks]

Question 4

a) Explain the working of priority scheduling policy with the help of suitable diagram in differentiating Internet packets for different level of quality of service (QoS). [6 marks]

b) Considering a video streaming application that uses Real Time Streaming Protocol (RTSP) to transmit 1 Mbps constant bit-rate codec video data on TCP over the best-effort based Internet.
   i) Explain how RTSP functions. [4 marks]
   ii) What is best-effort service model? Discuss the limitation of the best-effort service model in serving the video traffic. [6 marks]
   iii) Discuss one simple forward error correction mechanism that can be used for the video streaming application. [4 marks]

c) Determine the maximum number of hosts in a network which has a subnet mask of 255.255.255.0. Justify your answer. [5 marks]

End of Paper